

PLUMMER

Serial No.: 09/944,119

Response to Office Action dated August 15, 2003

**Amendments to the Claims:**

This listing of claims will replace all prior versions, and listings, of claims in this application.

**Listing of Claims:**

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Claim 1 (Currently Amended): A method for communicating between a first station and a second station over a distribution medium, comprising ~~the steps of:~~

~~the~~ The first station sending an alternating power signal over the distribution medium, the alternating power signal comprising a plurality of communication symbols;

~~the~~ The second station receiving the alternating power signal and determining therefrom the plurality of communication symbols;

~~the~~ The second station drawing current from the alternating power signal in a sequence corresponding to at least one further communication symbol; and

~~the~~ The first station determining the current drawn in the alternating power signal to recover the at least one further communication symbol.

Claim 2 (Currently Amended): The method of claim 1, wherein the alternating power signal has a substantially square wave-form, and has substantially equal equally proportions of positive and negative components, averaged over time.

Claim 3 (Currently Amended): The method of claim 2, wherein ~~the step of~~ the second station drawing current comprises the second station drawing current during a positive component and a negative component of the alternating power signal.

Claim 4 (Currently Amended): The method of claim 3, wherein the second station is arranged to draw current during the positive component of the alternating power signal in a sequence corresponding to the at least one further communication symbol, and

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to repeat the said current draw in the negative component ~~component~~ of the alternating power signal.

Claim 5 (Original): The method of claim 3, wherein the second station is arranged to draw current during a substantially centrally located portion of the positive component and negative component of the alternating power signal.

Claim 6 (Original): The method of claim 3, wherein the second station is arranged to draw current adjacent each rising edge and falling edge of the alternating power signal.

Claim 7 (Currently Amended): The method of claim 1, wherein ~~the step of~~ the second station drawing current further comprises the second station not deriving power from the alternating power signal for other purposes while drawing current corresponding to the at least one further communication symbol.

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Claim 8 (Currently Amended): The method of claim 1, wherein the communication ~~communications~~ symbols comprise '1', '0', 'idle', and 'sync'.

Claim 9 (Original): The method of claim 8, wherein the '0' symbol is represented by equal portions of positive and negative components in the alternating power signal, and the '1' symbol is represented by unequal portions of positive and negative components in the alternating power signal, and the proportion of positive and negative components in the alternating power signal representing a '1' symbol is alternated each time a '1' symbol is sent.

Claim 10 (Currently Amended): The method of claim 1, wherein the plurality of communication symbols form a stream, selected from one of:

a [[A]] command stream comprising a sync symbol, an instruction byte, and a plurality of station instructions;

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an ~~[[An]]~~ idle stream comprising a sync symbol, and a plurality of idle symbols;  
and

an ~~[[A]]~~ instruction stream, comprising a sync symbol, an instruction byte, a station address, and station data.

Claim 11 (Currently Amended): The method of claim 10, wherein there are a plurality of second stations, each second station having an address, each second station responsive to a station instruction or to station data ~~station instruction/data~~ at a position in the command stream corresponding to its ~~their~~ address, and ~~said step of each second station drawing current comprises~~ each second station draws ~~drawing~~ current during an idle pulse at a position in the command stream corresponding to its ~~their~~ address.

Claim 12 (Currently Amended): The method of claim 11 ~~10~~, wherein one said instruction byte corresponds to a second station activate/deactivate ~~an instruction to activate or deactivate each remote station~~, each second station activating or deactivating according to whether a ~~the~~ corresponding station instruction is a '1' symbol or a '0' symbol, respectively.

Claim 13 (Currently Amended): The method of claim 12, wherein each second station is arranged to count the number of other second stations that have been activated before it, and to activate an offset from the ~~said~~ sync pulse corresponding to the ~~said~~ number of other second stations.

Claim 14 (Currently Amended): An apparatus for communicating with at least one station over a distribution medium, comprising:

means ~~Means~~ for providing an alternating power signal over the distribution medium, the alternating power signal comprising a plurality of communication symbols;  
and

control ~~Control~~ means arranged to determine ~~to~~ current draw in the alternating power signal to recover at least one further communication symbol from a second station.

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Claim 15 (Currently Amended): The apparatus of claim 14, wherein the means for providing an alternating power signal comprises a power generating switching circuit connected to and operating under control of the control means, the power generating switching circuit operable to provide an alternating power signal over the said distribution medium.

Claim 16 (Currently Amended): The apparatus ~~method~~ of claim 15, wherein the power generating switching circuit is arranged to provide an alternating power signal that has a substantially square wave-form, and has substantially equal ~~equally~~ proportions of positive and negative components, averaged over time.

Claim 17 (Currently Amended): The apparatus of claim 14, wherein the communication ~~communications~~ symbols comprise '1', '0', 'idle', and 'sync'.

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Claim 18 (Original): The apparatus of claim 17, wherein the '0' symbol is represented by equal portions of positive and negative components in the alternating power signal, and the '1' symbol is represented by unequal portions of positive and negative components in the alternating power signal, and the proportion of positive and negative components in the alternating power signal representing a '1' symbol is alternated each time a '1' symbol is sent.

Claim 19 (Currently Amended): The apparatus of claim 15, wherein the control means is arranged to control the power generating switching circuit to form the alternating power signal from a plurality of communication symbols forming a stream, selected from one of:

a [[A]] command stream comprising a sync symbol, an instruction byte, and station instructions;

an [[An]] idle stream comprising a sync symbol, and a plurality of idle symbols;  
and

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an [[A]] instruction stream, comprising a sync symbol, an instruction byte, a station address, and station data.

Claim 20 (Original): The apparatus of claim 14, wherein the control means is arranged to determine current draw during a substantially centrally located portion in each positive component and negative component of the alternating power signal.

Claim 21 (Original): The apparatus of claim 14, wherein the control means is arranged to determine current draw adjacent each rising edge and falling edge of the alternating power signal.

Claim 22 (Currently Amended): An apparatus for communicating with a first station over a distribution medium, comprising:

means ~~Means~~ for receiving an alternating power signal comprising a plurality of communication symbols over the distribution medium, and for recovering the communication symbols therefrom; and

control ~~Control~~ means arranged to draw current from the alternating power signal in a sequence corresponding to at least one further communication symbol.

Claim 23 (Original): The apparatus of claim 22, wherein the control means is arranged to draw current during a positive component and a negative component of the alternating power signal.

Claim 24 (Currently Amended): The apparatus of claim 22, wherein the control means is arranged to draw current during the positive component of the alternating power signal in a sequence corresponding to the at least one further communication symbol, and to repeat the ~~said~~ current draw in the negative portion of the alternating power signal.

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Claim 25 (Original): The apparatus of claim 24, wherein the second station is arranged to draw current during a substantially centrally located section in a positive component and negative component of the alternating power signal.

Claim 26 (Original): The apparatus of claim 24, wherein the second station is arranged to draw current adjacent each rising edge and falling edge of the alternating power signal.

Claim 27 (Currently Amended): The apparatus of claim 22, wherein the second station is arranged not to derive power from the alternating power signal during a the prescribed section other than the current draw.

Claim 28 (Currently Amended): The apparatus of claim 22, wherein the means for recovering is arranged to recover a plurality of communication symbols forming a stream, and to decode the said stream into one of:

a [[A]] command stream comprising a sync symbol, an instruction byte, and station instructions;

an [[An]] idle stream comprising a sync symbol, and a plurality of idle symbols;  
and

an [[A]] instruction stream, comprising a sync symbol, an instruction byte, a station address, and station data.

Claim 29 (Currently Amended): The apparatus of claim 28, wherein the said apparatus has an address, the said means for recovering being responsive to station instruction and station data ~~instruction/data~~ at a position in the command stream corresponding to the address, the said control means arranged to draw current during an idle pulse at a position in the command stream corresponding to the address.

Claim 30 (Currently Amended): The apparatus of claim 29, wherein the said control means is arranged to count the number of other apparatus that have been activated

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before it, and to activate at an offset from the said sync symbol corresponding to the said number of other apparatus.

Claim 31 (Currently Amended): A method for controlling a plurality of second stations, comprising ~~the steps of~~:  
distributing ~~Distributing~~ power to the second stations via a distribution medium;  
distributing ~~Distributing~~ a reference datum to the said second stations; and  
activating the ~~Activating said~~ second stations at a prescribed phase offset from the reference datum.

Claim 32 (Original): The method of claim 31, wherein the alternating power signal has a substantially square wave-form of equal amplitude, and has substantially equal ~~equally~~ proportions of positive and negative components, averaged over time.

Claim 33 (Currently Amended): The method of claim 31, wherein the ~~step of~~ distributing of a reference datum further comprises ~~the step of~~ distributing a plurality of activation marks after the reference datum.

Claim 34 (Original): The method of claim 31, wherein the reference datum comprises a predetermined sequence of positive and negative components in the alternating power signal.

Claim 35 (Currently Amended): The method of claim 33 ~~34~~, wherein the plurality of activation marks comprise a further predetermined sequence of positive and negative components in the alternating power signal after the reference datum.

Claim 36 (Currently Amended): The method of claim 33 ~~34~~, wherein the ~~step of~~ activating of second stations comprises ~~the step of~~ sending instructions to each second station whether or not to activate embedded in the plurality of ~~said~~ activation marks.

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Claim 37 (Currently Amended): An apparatus for controlling a plurality of second stations connected to the apparatus by a distribution medium, the apparatus comprising:

means ~~Means~~ for providing power to the second stations via the a distribution medium; and

control ~~Control~~ means arranged to provide a reference datum to the second stations and to instruct each second station to activate, each second station responsive to the instruction to activate at a prescribed phase offset from the reference datum.

Claim 38 (Currently Amended): The apparatus of claim 37, wherein the means for providing power comprises a power generating ~~switching~~ circuit connected to an operating under control of the control means, the power generating ~~switching~~ circuit operable to provide an alternating power signal of variable frequency over the ~~said~~ distribution medium.

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Claim 39 (Currently Amended): The apparatus of claim 38, wherein the power generating ~~switching~~ circuit is arranged to produce an alternating power signal that has a substantially square wave-form, and has substantially equal ~~equally~~ proportions of positive and negative components, averaged over time.

Claim 40 (Original): The apparatus of claim 38, wherein the control means is further arranged to provide a plurality of activation marks after the reference datum.

Claim 41 (Currently Amended): The apparatus of claim 38, wherein the control means is arranged to provide the reference datum by controlling the power generating ~~switching~~ circuit to produce a predetermined sequence of positive and negative components in the alternating power signal.

Claim 42 (Currently Amended): The apparatus of claim 40 ~~41~~, wherein the control means is arranged to provide the activation marks by controlling the power



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generating ~~switching~~ circuit to produce a further predetermined sequence of positive and negative components in the alternating power signal after the reference datum.

Claim 43 (Currently Amended): The apparatus of claim 40, wherein the control means is arranged to provide instructions to each second station by controlling the power generating ~~switching~~ circuit to produce a prescribed sequence of alternating positive and negative components in the alternating power signal as the activation marks, each activation mark corresponding to an instruction to a second station whether or not to activate.

Claim 44 (New): The method of claim 1, wherein the first and second station comprise part of an irrigation system.

Claim 45 (New): The apparatus of claim 14, wherein the at least one second station comprises part of an irrigation system.

Claim 46 (New): The apparatus of claim 22, wherein the first station comprises part of an irrigation system.

Claim 47 (New): The method of claim 31, wherein the second stations comprise part of an irrigation system.

Claim 48 (New): The apparatus of claim 37, wherein the second stations comprise part of an irrigation system.

Claim 49 (New): An apparatus for communicating with at least one station over a distribution medium, comprising:

a power generating device for providing an alternating power signal over the distribution medium, the alternating power signal comprising a plurality of communication symbols; and

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a control device arranged to determine current draw in the alternating power signal to recover at least one further communication symbol from a second station.

Claim 50 (New): The apparatus of claim 49, wherein the at least one station comprises part of an irrigation system.

Claim 51 (New): An apparatus for communicating with a first station over a distribution medium, comprising:

a receiver for receiving an alternating power signal comprising a plurality of communication symbols over the distribution medium, and for recovering the communication symbols therefrom; and

a control device arranged to draw current from the alternating power signal in a sequence corresponding to at least one further communication symbol.

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Claim 52 (New): The apparatus of claim 51, wherein the first station comprises part of an irrigation system.

Claim 53 (New): An apparatus for controlling a plurality of second stations connected to the apparatus by a distribution medium, the apparatus comprising:

a power generating device for providing power to the second stations via the distribution medium; and

a control device arranged to provide a reference datum to the second stations and to instruct each second station to activate, each second station being responsive to the instruction to activate at a prescribed phase offset from the reference datum.

Claim 54 (New): The apparatus according to claim 53, wherein the second stations comprise part of an irrigation system.